

Part 1: Introduction to Potential to Emit

What is the purpose of this document?

The applicability of some air quality requirements is based upon a facility's potential to emit (PTE) air pollutants. The greater your PTE, the more likely you are subject to the regulations. This document will help you understand what PTE is, how it is calculated, and what air regulations are based on PTE.

Since PTE can be a difficult concept to comprehend, you may wish to contact the Michigan Clean Air Assistance Program at (800) 662-9278 with questions you have as you read this document.

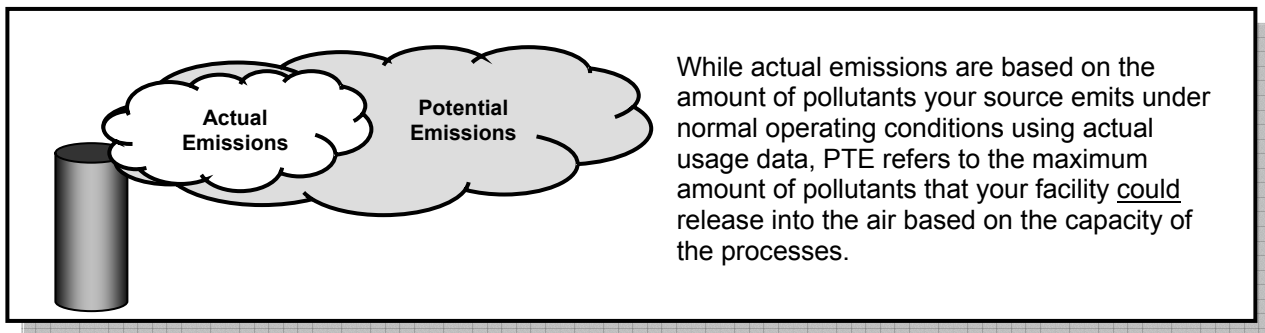
What is PTE?

The definition for PTE is contained in R 336.1116(m) or Rule 116 (m) of the Michigan Air Pollution Control Rules (see Appendix A).

To put it simply, PTE is the maximum amount of air contaminants that your source could emit if:

- each process is operated at 100% of its design capacity;
- each process operated 24 hours/day, 365 days/year;
- materials that emit the most air contaminants are used or processed 100% of the time; and
- air pollution control equipment is turned off.

However, as you will see in Part 2 of this workbook, process bottlenecks, permit conditions, air quality rules, and compliance/enforcement documents may legally restrict the capacity of your facility to emit an air contaminant.



Why is applicability to many regulations based on my facility's PTE and not actual emissions?

PTE is a fair way to categorize and regulate facilities. It is a consistent criteria that does not change unless new equipment is added or operational restrictions are changed. Actual emissions, on the other hand, can fluctuate from year-to-year due to changes in the economy or other factors affecting productivity.

What pollutants are regulated?

Pollutants are regulated under the Clean Air Act (CAA) based on whether they can have negative effects on human health or the environment. This document focuses on three categories of regulated pollutants (Table 1-1):

- *Criteria pollutants*
- *Hazardous air pollutants*
- *Other regulated pollutants*

Table 1-1: Regulated Air Pollutants

Criteria Pollutants

- Carbon Monoxide (CO)
- Lead (Pb)
- Ozone (O₃), including Volatile Organic Compounds (VOC) and Nitrogen Oxides (NO_x), which are ozone precursors*
- Nitrogen Dioxide (NO₂)
- Particulate Matter with an aerodynamic diameter less than or equal to 10 micrometers (PM-10)**
- Sulfur Dioxide (SO₂)

Hazardous Air Pollutants

Table 1-5 on page 1-5 lists the 188 hazardous air pollutants (HAPs), also known as air toxics. Some HAPs are VOCs and count as criteria pollutants as well as HAP emissions. HAPs in particulate form can also be counted as PM, another criteria pollutant.

Other Regulated Pollutants

National Emission Standards for Hazardous Air Pollutants (NESHAP) Pollutants

- Arsenic
- Asbestos
- Beryllium
- Benzene
- Mercury
- Radionuclides
- Vinyl chloride

New Source Performance Standard (NSPS) Pollutants

- Dioxin/furan
- Fluorides
- Hydrogen chloride
- Hydrogen sulfide
- Mercury
- Nonmethane organic compounds
- Reduced sulfur compounds
- Sulfuric acid mist
- Total organic compounds
- Total particulate matter
- Total reduced sulfur

Class I and Class II Pollutants

Title VI of the Clean Air Act Amendments of 1990 requires the phase-out of chlorofluorocarbons (CFCs) that deplete the ozone layer in the upper atmosphere (this is the “good” ozone that protects us from the sun’s harmful rays). These ozone depleting substances are divided into two classes, Class I and Class II air pollutants. Table 1-4 contains a list of these ozone depleting pollutants.

* Most facilities do not directly emit ozone. However, they may emit VOCs and NO_x, which contribute to ozone formation. Therefore, VOCs and NO_x are often considered regulated pollutants. A VOC is any compound of carbon or mixture of compounds of carbon that participates in photochemical reactions excluding the compounds listed in Table 1-3.

**If you are unable to differentiate between the different sizes of particulate matter, assume all particulate matter emitted is PM-10.

What does it mean if my facility is a major source of an air pollutant?

Table 1-2 lists the thresholds for determining whether your source is a major or minor source of air pollution. It is important to know whether your business is a “major” or “minor” source of air emissions because many requirements only apply to major sources (e.g., the Renewable Operating Permit Program). If your business is not a major source, then you are considered a minor source. As a minor source, you may not have to meet certain requirements, or you may have requirements that are easier to meet. Once a business is classified as a major source, generally its classification cannot be changed to a minor source except under certain limited circumstances that involve additional administrative and permitting procedures.

Part 3 of this workbook discusses the requirements associated with being a major source.

Table 1-2: Major Source Emission Thresholds

Type of Pollutant	Major Source Threshold	Common Sources of Pollutant
Particulate Matter (PM-10)	100 tons/year	Dusty activities such as grain handling, milling, sand and gravel operations
Volatile Organic Compounds (VOCs)	100 tons/year	Solvent cleaning, painting, fuel storage and transfer
Carbon Monoxide (CO)	100 tons/year	Fuel combustion
Nitrogen Oxides (NO _x)	100 tons/year	Fuel combustion
Sulfur Dioxide (SO ₂)	100 tons/year	Fuel combustion
Lead (Pb)	100 tons/year	Wave soldering, lead smelting and recycling
Hazardous Air Pollutants (HAPs) Any single HAP Any combination of HAPs	10 tons/year 25 tons/year	Solvent cleaning, painting, fuel storage and transfer
Any other regulated air contaminant	100 tons/year	

A source that has the potential to emit 10 tons/year of any one hazardous air pollutant (HAP), 25 tons/year of any combination of HAPs, or 100 tons/year of any regulated air contaminant is considered a major source (see Table 1-2) and is subject to the Renewable Operating Permit Program.

Table 1-3: Compounds Not Considered VOCs

<ul style="list-style-type: none"> • Carbon monoxide • Carbon dioxide • Carbonic acid • Metallic carbides or carbonates • Boron carbide • Silicon carbide • Ammonium carbonate • Ammonium bicarbonate • Methane • Ethane • Methyl chloroform* • Acetone • Cyclic, branched, or linear completely methylated siloxanes • Parachlorobenzotrifluoride • Perchloroethylene • Trichlorofluoromethane (CFC-11) • Dichlorodifluoromethane (CFC-12) • 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113) • 1,2-dichloro-1,1,2,2-tetrafluoroethane (CFC-114) • Chloropentafluoroethane (CFC-115) • 1,1-dichloro-1-fluoroethane (HCFC-141b) 	<ul style="list-style-type: none"> • 1 chloro-1,1-difluoroethane (HCFC-142b) • Chlorodifluoromethane (HCFC-22) • 1,1,1-trifluoro-2,2-dichloroethane (HCFC-123) • 2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124) • Trifluoromethane (HFC-23) • Pentafluoroethane (HFC-125) • 1,1,2,2-tetrafluoroethane (HFC-134) • 1,1,1,2-tetrafluoroethane (HFC-134a) • 1,1,1-trifluoroethane (HFC-143a) • 1,1-difluoroethane (HFC-152a) • 3,3-dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca) • 1,3-dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb) • 1,1,1,2,3,4,4,5,5-decafluoropentane (HFC 43-10mee) • Difluoromethane (HFC-32) • Ethyl fluoride (HFC-161) • 1,1,1,3,3,3-hexafluoropropane (HFC-236fa) • 1,1,2,2,3-pentafluoropropane (HFC-245ca) • 1,1,2,3,3-pentafluoropropane (HFC-245ea) 	<ul style="list-style-type: none"> • 1,1,1,2,3-pentafluoropropane (HFC-245eb) • 1,1,1,3,3-pentafluoropropane (HFC-245fa) • 1,1,1,2,3,3-hexafluoropropane (HFC-236ea) • 1,1,1,3,3-pentafluorobutane (HFC365mfc) • Chlorofluoromethane (HCFC-31) • 1,2-dichloro-1,1,2-trifluoroethane (HCFC-123a) • 1-chloro-1-fluoroethane (HCFC-151a) • 1,1,1,2,2,3,3,4,4-nonafluoro-4-methoxybutane • 2-(difluoromethoxymethyl)-1,1,1,2,3,3,3-heptafluoropropane • 1-ethoxy-1,1,2,2,3,3,4,4,4-nonafluorobutane • 2-(ethoxydifluoromethyl)-1,1,1,2,3,3,3-heptafluoropropane • Methyl acetate* • Perfluorocarbon compounds* • Methylene chloride* • Other compounds in materials other than surface coatings that have a vapor pressure ≤ 0.1 mm Hg at the temperature at which they are used.
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*Refer to Rule 122(f) for more information about this compound.

Table 1-4: Class I and Class II Ozone Depleting Substances

Class I Substances	Class II Substances	
Group I: chlorofluorocarbon-11 (CFC-11) chlorofluorocarbon-12 (CFC-12) chlorofluorocarbon-113 (CFC-113) chlorofluorocarbon-114 (CFC-114) chlorofluorocarbon-115 (CFC-115) Group II: halon-1211 halon-1301 halon-2402 Group III: chlorofluorocarbon-13 (CFC-13) chlorofluorocarbon-111 (CFC-111) chlorofluorocarbon-112 (CFC-112) chlorofluorocarbon-211 (CFC-211) chlorofluorocarbon-212 (CFC-212) chlorofluorocarbon-213 (CFC-213) chlorofluorocarbon-214 (CFC-214) chlorofluorocarbon-215 (CFC-215) chlorofluorocarbon-216 (CFC-216) chlorofluorocarbon-217 (CFC-217) Group IV: carbon tetrachloride Group V: methyl chloroform	hydrochlorofluorocarbon-21 (HCFC-21) hydrochlorofluorocarbon-22 (HCFC-22) hydrochlorofluorocarbon-31 (HCFC-31) hydrochlorofluorocarbon-121 (HCFC-121) hydrochlorofluorocarbon-122 (HCFC-122) hydrochlorofluorocarbon-123 (HCFC-123) hydrochlorofluorocarbon-124 (HCFC-124) hydrochlorofluorocarbon-131 (HCFC-131) hydrochlorofluorocarbon-132 (HCFC-132) hydrochlorofluorocarbon-133 (HCFC-133) hydrochlorofluorocarbon-141 (HCFC-141) hydrochlorofluorocarbon-142 (HCFC-142) hydrochlorofluorocarbon-221 (HCFC-221) hydrochlorofluorocarbon-222 (HCFC-222) hydrochlorofluorocarbon-223 (HCFC-223) hydrochlorofluorocarbon-224 (HCFC-224) hydrochlorofluorocarbon-225 (HCFC-225) hydrochlorofluorocarbon-226 (HCFC-226) hydrochlorofluorocarbon-231 (HCFC-231) hydrochlorofluorocarbon-232 (HCFC-232) hydrochlorofluorocarbon-233 (HCFC-233) hydrochlorofluorocarbon-234 (HCFC-234) hydrochlorofluorocarbon-235 (HCFC-235)	hydrochlorofluorocarbon-241 (HCFC-241) hydrochlorofluorocarbon-242 (HCFC-242) hydrochlorofluorocarbon-243 (HCFC-243) hydrochlorofluorocarbon-244 (HCFC-244) hydrochlorofluorocarbon-251 (HCFC-251) hydrochlorofluorocarbon-252 (HCFC-252) hydrochlorofluorocarbon-253 (HCFC-253) hydrochlorofluorocarbon-261 (HCFC-261) hydrochlorofluorocarbon-262 (HCFC-262) hydrochlorofluorocarbon-271 (HCFC-271)

Table 1-5: Hazardous Air Pollutants (HAPs)

CAS No.	Chemical	CAS No.	Chemical	CAS No.	Chemical	CAS No.	Chemical
75070	Acetaldehyde	91941	3,3-Dichlorobenzidine	302012	Hydrazine	78875	Propylene dichloride (1,2-Dichloropropane)
60355	Acetamide	111444	Dichloroethyl ether (Bis(2-chloroethyl)ether)	7647010	Hydrochloric acid	75558	1,2-Propylenimine (2-Methyl aziridine)
75058	Acetonitrile	542756	1,3-Dichloropropene	7664393	Hydrogen fluoride (hydrofluoric acid)	91225	Quinoline
98862	Acetophenone	62737	Dichlorvos	123319	Hydroquinone	106514	Quinone
53963	2-Acetylaminofluorene	111422	Diethanolamine	78591	Isophorone	100425	Styrene
107028	Acrolein	21697	N,N-Diethyl aniline (N,N-Dimethylaniline)	58899	Lindane (all isomers)	96093	Styrene oxide
79061	Acrylamide	64675	Diethyl sulfate	108316	Maleic anhydride	1746016	2,3,7,8-Tetrachlorodibenzo p-dioxin
79107	Acrylic acid	119904	3,3-Dimethoxybenzidine	67561	Methanol	79345	1,1,2,2-Tetrachloroethane
107131	Acrylonitrile	60117	Dimethyl aminoazobenzene	72435	Methoxychlor	127184	Tetrachloroethylene (Perchloroethylene)
107051	Allyl chloride	119937	3,3-Dimethyl benzidine	74839	Methyl bromide (Bromomethane)	7550450	Titanium tetrachloride
92671	4-Aminobiphenyl	79447	Dimethyl carbarmoyl chloride	74873	Methyl chloride (Chloromethane)	108883	Toluene
62533	Aniline	68122	Dimethyl formamide	71556	Methyl chloroform (1,1,1-Trichloroethane)	95807	2,4-Toluene diamine
90040	o-Anisidine	57147	1,1 Dimethyl hydrazine	78933	Methyl ethyl ketone (2-Butanone)	584849	2,4-Toluene diisocyanate
1332214	Asbestos	131113	Dimethyl phthalate	60344	Methyl hydrazine	95534	o-Toluidine
71432	Benzene	77781	Dimethyl sulfate	74884	Methyl iodide (Iodomethane)	8001352	Toxaphene (chlorinated camphene)
92875	Benidine	534521	4,6-Dinitro-o-cresol, and salts	108101	Methyl isobutyl ketone (Hexone)	120821	1,2,4-Trichlorobenzene
98077	Benzotrichloride	51285	2,4-Dinitrophenol	624839	Methyl isocyanate	79005	1,1,2-Trichloroethane
100447	Benzyl chloride	121142	2,4-Dinitrotoluene	80626	Methyl methacrylate	79016	Trichloroethylene
92524	Biphenyl	123911	1,4-Dioxane (1,4-Diethyleneoxide)	1634044	Methyl tert butyl ether	95954	2,4,5-Trichlorophenol
117817	Bis (2-ethylhexyl) phthalate (DEHP)	122667	1,2-Diphenylhydrazine	101144	4,4-Methylene bis (2-chloroaniline)	88062	2,4,6-Trichlorophenol
542881	Bis (chloromethyl) ether	106898	Epichlorohydrin (1-Chloro-2,3-epoxypropane)	75092	Methylene chloride (Dichloromethane)	121448	Triethylamine
75252	Bromoform	106887	1,2-Epoxybutane	101688	Methylene diphenyl diisocyanate (MDI)	1582098	Trifluralin
106990	1,3-Butadiene	140885	Ethyl acrylate	101779	4,4'-methylenedianiline	540841	2,2,4-Trimethylpentane
156627	Calcium cyanamide	100414	Ethyl benzene	91203	Naphtalene	108054	Vinyl acetate
133062	Captan	51796	Ethyl carbamate (Urethane)	98953	Nitrobenzene	593602	Vinyl bromide
63252	Carbaryl	75003	Ethyl chloride (Chloroethane)	92933	4-Nitrobiphenyl	75014	Vinyl chloride
75150	Carbon disulfide	106934	Ethylene dibromide (Dibromoethane)	100027	4-Nitrophenol	75354	Vinylidene chloride (1,1 Dichloroethylene)
56235	Carbon tetrachloride	107062	Ethylene dichloride (1,2-Dichloroethane)	79469	2-Nitropropane	1330207	Xylenes (isomers and mixtures)
463581	Carbonyl sulfide	107211	Ethylene glycol	684935	N-Nitroso-N-methylurea	95476	o-Xylenes
120809	Catechol	151564	Ethylene imine (Aziridine)	62759	N-Nitrosodimethylamine	108383	m-Xylenes
133904	Chloramben	75218	Ethylene oxide	59892	N-Nitrosomorpholine	106423	p-Xylenes
57749	Chlordane	96457	Ethylene thiourea	56382	Parathion	COMPOUNDS	
7782505	Chlorine	75343	Ethylidene dichloride (1,1-Dichloroethane)	82688	Pentachloronitrobenzene (Quintobenzene)	Antimony compounds	
79118	Chloroacetic acid	50000	Formaldehyde	87865	Pentachlorophenol	Arsenic compounds (inorganic including arsine)	
532274	2-Chloroacetophenone	76448	Heptachlor	108952	Phenol	Beryllium compounds	
108907	Chlorobenzene	118741	Hexachlorobenzene	106503	p-Phenylenediamine	Cadmium compounds	
510156	Chlorobenzilate	87683	Hexachlorobutadiene	75445	Phosgene	Chromium compounds	
67663	Chloroform	77474	Hexachlorocyclopentadiene	7803512	Phosphine	Cobalt compounds	
107302	Chloromethyl methyl ether	822060	Hexamethylene-1,6-diisocyanate	7723140	Phosphorus	Coke oven emissions	
126998	Chloroprene	680319	Hexamethyl phosphoramidate	85449	Phthalic anhydride	Cyanide compounds	
1319773	Cresols/Cresylic acid (isomers and mixtures)	110543	Hexane	1336363	Polychlorinated biphenyls (Aroclors)	Fine mineral fibers	
95487	o-Cresol			1120714	1,3-Propane sultone	Glycol ethers*	
108394	m-Cresol			57578	beta-Propiolactone	Lead compounds	
106445	p-Cresol			123386	Propionaldehyde	Manganese compounds	
98828	Cumene			114261	Propoxur (Baygon)	Mercury compounds	
94757	2,4-D, salts and esters			75569	Propylene oxide	Nickel compounds	
3547044	DDE					Polycyclic organic matter	
334883	Diazomethane					Radionuclides (including radon)	
132649	Dibenzofurans					Selenium compounds	
96128	1,2-Dibromo-3-chloropropane						
84742	Dibutylphthalate						
106467	1,4-Dichlorobenzene(p)						

*Note: Ethylene glycol mono-butyl ether (EGBE) was removed from the HAP list in December 2004.

